

## **Subsidence**

Land subsidence occurs when the ground surface decreases in elevation. It can be caused by various natural phenomena such as tectonic movement, consolidation, hydrocompaction, or rapid sedimentation. Subsidence can also result from a variety of human activities, including withdrawing water or petroleum from the subsurface. The numerous fine-grained (clayey) lenses in Central Valley deposits are conducive to subsidence. The southern San Joaquin Valley (south of Tracy Substation) has the largest volume of land subsidence in the world (from groundwater withdrawal), and many areas of the Central Valley are vulnerable to this phenomenon. The other important cause of subsidence in the Central Valley is oxidation and compaction of peat soils caused by draining soils nears the confluence of the San Joaquin and Sacramento Rivers. The southern portion of Segment E, from approximately Stockton to Tracy, runs along the edge of an area of subsidence caused by compaction of peat according to a 1952 Field survey (Williamson 1989). Subsidence is typically a slow process, unless induced by seismic activity. Its potential effects on structures might not be evident for years or decades.

## **Landslides and Rockfalls**

Landslides, rockfalls, mudslides, and debris avalanches refer to rock or debris descending a slope due to gravity. Slopes within the study area are typically shallow or nonexistent, making landslides unlikely. Construction in areas with steep slopes should be avoided whenever possible. These limited areas may include the banks of some rivers, levees, or canals.

## **Liquefaction**

Liquefaction occurs when saturated soils lose strength and cohesion when subjected to dynamic forces, such as shaking during an earthquake. Liquefaction can also occur in unsaturated soils with low cohesion, such as sand. Liquefaction and related phenomena have caused tremendous amount of damage during historical earthquakes when water pressure between soil particles can increase until the soil cohesion is lost, along with the support that it normally supplies to building foundations. Liquefaction occurs more frequently in areas where groundwater is very shallow, such as in river deposits near water bodies. Quaternary River Deposits (Segments A, A<sub>1</sub>, C, D, E, and E<sub>1</sub>) may be prone to liquefaction.

## **4.7.2 ENVIRONMENTAL CONSEQUENCES**

### **4.7.2.1 STANDARDS OF SIGNIFICANCE**

Significant geologic impacts would result if structures were to fail or create hazards to adjacent property due to slope instability, effects of earthquake, or adverse soil conditions (such as compressible, expansive, or corrosive soils).

## **4.7.2.2 ENVIRONMENTAL PROTECTION MEASURES**

EPMs for geologic resources from Table 3-4 include the following:

- A California registered Professional Geotechnical Engineer would evaluate the potential for geotechnical hazards and unstable slopes on the centerline route and areas of new road construction or widening on slopes with over 15 percent gradient.
- Geological hazards would be evaluated during final design specification for each structure location and road construction area. Options would include avoidance of a poor site by selection of a site with stable conditions, or correction of the unstable slope conditions.

## **4.7.2.3 IMPACTS FROM THE PROPOSED ACTION, ALTERNATIVE 1, ALTERNATIVE 2, ALTERNATIVE 3, AND NO ACTION**

No noteworthy geological features were identified to distinguish among the Proposed Action and alternatives. Therefore, the discussion on geology applies to all alternatives. Potential impacts to the Proposed Action and alternatives would be similar, although the specific locations might vary. The route for the Proposed Action and Alternatives 1 and 2 would cross a fault zone that has not been active within the past 1.6 million years; therefore, this is not considered to have more seismic impact than Alternative 3.

Any steep or unstable slopes near the Proposed Action or alternatives ROW would be avoided or minimized with standard construction practices described above. Alternative 3 would cross fewer miles of river deposits than the Proposed Action or other alternatives; however, it would cross 26 miles of floodbasin deposits that could also succumb to earthquake forces, such as liquefaction, more readily than the continental deposits that predominate in the Proposed Action, Alternative 1, and Alternative 2. Geological hazards would be evaluated during final design specification for each structure location and road construction area and standard design practices would be used.

Sand and gravel mining operations (Segment D) would be avoided, and would not be impacted by the Proposed Action or alternatives. No significant geologic impacts are noted for the Proposed Action or alternatives.

## **4.8 HEALTH AND SAFETY**

### **4.8.1 AFFECTED ENVIRONMENT**

This section describes the health and safety issues associated with the Proposed Action and alternatives.

#### 4.8.1.1 RESOURCE STUDY AREA

The resource study area for health and safety depends on the specific health and safety issue. For example, the study area for hazardous materials and herbicides is the area where they are stored, transported, or applied. Fires, electrocutions, and falls could occur anywhere along the transmission line, making the proposed ROW the study area.

#### 4.8.1.2 ISSUES OF ENVIRONMENTAL CONCERN

Issues of environmental concern for health and safety are spills or mishandling of hazardous materials, hazardous waste, herbicides, electrical contact (fires, burns, and electrocutions), and worker falls.

#### 4.8.1.3 CHARACTERIZATION

Hazards can occur under existing conditions as discussed below:

##### **Hazardous Materials and Hazardous waste**

Hazardous materials concerns could arise from spills (gasoline, diesel fuel, oil, or solvents) from containers or vehicles. Spills could contaminate soils or leach into ground or surface water. Known storage locations include existing substations (O'Banion, Elverta, Hedge, Hurley, Elk Grove, and Tracy). California-designated hazardous waste has been stored at Tracy and Elverta substations. The waste is managed in accordance with regulations, and is removed for final disposal within allowable time limits. The other substations may store hazardous waste (for example, bushings and oil) for short periods as allowed by regulation.

Western applies herbicides along the existing ROWs (Segments A, B, C, D, E, F, and H) where vegetation threatens the safe operation of the transmission line and related facilities. Herbicide misuse, over-spray, or drift could adversely affect humans, wildlife, vegetation, or water.

##### **Electrical Hazards**

Electrical hazards could include vegetation or equipment fires, electrical burns, or electrocutions to humans or animals. Electrical hazards could occur anywhere near energized conductors or facilities (Segments A, B, C, D, E, F, and H). These hazards are primarily a concern for construction and maintenance workers.

##### **Fall Hazards**

Fall hazards could affect individuals working at heights. Elevated work is essential for assembly and repair of transmission structures and equipment (Segments A, B, C, D, E, F, and H). Workers typically perform this work from bucket trucks or by climbing structures. In both instances, Western requires workers to use fall-protection devices.

#### 4.8.2 ENVIRONMENTAL CONSEQUENCES

The Proposed Action and alternatives could affect the environment if hazardous materials were released from spills as discussed above.

##### 4.8.2.1 STANDARDS OF SIGNIFICANCE

The Proposed Action and alternatives would have significant and adverse effect on health and safety if they would:

- Create a public or worker health hazard beyond limits set by health and safety regulatory organizations, or
- Interfere with adopted emergency response plans.

##### 4.8.2.2 ENVIRONMENTAL PROTECTION MEASURES

EPMs for Health and Safety from Table 3-4 include the following:

- Conform with safety requirements for maintaining the flow of public traffic and conduct construction operations to offer the least possible obstruction and inconvenience to public transportation.
- Comply with all applicable health and safety standards.
- Some land uses occurring within the ROW would require temporary closure or limited access. Proper signage would be posted in these areas.
- For identified locations, structures and/or shield wire would be marked with highly visible devices where required by governmental agencies (for example, the Federal Aviation Administration [FAA]).

Each health and safety issue described above is highly regulated by one or more of the following: U.S. Department of Transportation (DOT), EPA, Occupational Safety and Health Administration (OSHA), and DOE, as well as state, county, and local governments. Additionally, Western and its contractors are required to comply with safety and environmental protection policies and guidance developed by Western, including Western's Occupational Safety Program (WAPA Order 3790.1B), the Power System Maintenance Manual (PSMM), the Power System Safety Manual (PSSM), and PSOM.

##### 4.8.2.3 IMPACTS FROM THE PROPOSED ACTION, ALTERNATIVE 1, ALTERNATIVE 2, ALTERNATIVE 3, AND NO ACTION

Construction and maintenance activities increase exposure to safety and health hazards. The risk varies among the Proposed Action and alternatives, increasing where substances are stored or transferred, live electrical components are likely to contact vegetation, animals, or

humans, or where workers conduct their tasks at heights. Generally, new construction would be most intensive in worker time and exposure to these hazards, followed by reconductoring, then maintenance. Therefore, the Proposed Action and Alternative 3 would be expected to present more health and safety risk than Alternative 2, followed by Alternative 1. The No Action Alternative would present the least risk. Performed in compliance with all applicable regulations and guidance, activities for the Proposed Action and alternatives would pose no significant threat to the health and safety of workers or the public.

## 4.9 LAND USE

### 4.9.1 AFFECTED ENVIRONMENT

The purpose of the land use study was to identify and describe all major land uses, which could be affected by the construction and operation of the Proposed Action and alternatives. Western compiled land use information from maps and existing literature from public agencies and private organizations. Data sources for the baseline inventory included interpretations from USGS 7.5-

minute topographic quadrangle sheets and natural color aerial photographs. Baseline data were supplemented by meetings with Federal, state, and county planning, and land management agencies. Several agencies also supplied pertinent documents and maps.

#### 4.9.1.1 RESOURCE STUDY AREA

The land use study area includes the transmission-line corridor and adjacent land uses along the corridor. The study area extended up to 0.5 mile from the ROW for the Proposed Action and alternatives. Appendix E presents aerial photographs of the area around the Proposed Action and alternatives and provides visual examples of the surrounding land.

#### 4.9.1.2 ISSUES OF ENVIRONMENTAL CONCERN

Issues of concern identified during scoping included proximity of transmission lines to residential areas, loss of prime farmland, effects on recreation and open space areas, and potential interference with traffic patterns during construction. Table 4.9-1 presents types of land use compatible within and adjacent to the ROW.

**Table 4.9-1. Compatibility of Land Use Types  
Within and Adjacent to the Transmission Line ROW**

Land Use Type	Compatibility with Transmission Line	
	Within ROW	Adjacent to ROW
Residential/Developed Urban	Not allowed, removal of structures	Allowable, potential electrical annoyance and visual effects
Commercial/Industrial	Not allowed, removal of structures	Allowed visual effects and potential interference with access
Airport	Not allowed	Not allowed immediately adjacent to the ROW due to conflicts with aircraft flight paths
Surface Mining/Quarry	Not allowed, cessation of use	Generally allowable
Landfill	Active landfill areas not allowed/cessation of use	Generally allowable
Agricultural Land	Possible land/easement acquisition, but use would be allowed to continue. Some potential interruptions to irrigation, tilling and harvesting techniques. Removal of use at structure footings. Height restrictions for orchard crops and equipment.	Generally allowable
Cemetery	Use would be allowed to continue, possible displacement at structure footings and change in access	Allowable, visual effects
School/Church	Not allowed, removal of structures/cessation of use	Generally allowable. Potential electrical annoyance (radio/TV interference) and visual effects.

Sources: American Electric Power Co., 1995, and adapted from California Public Utilities Commission (CPUC), 1987.

ROW: right-of-way